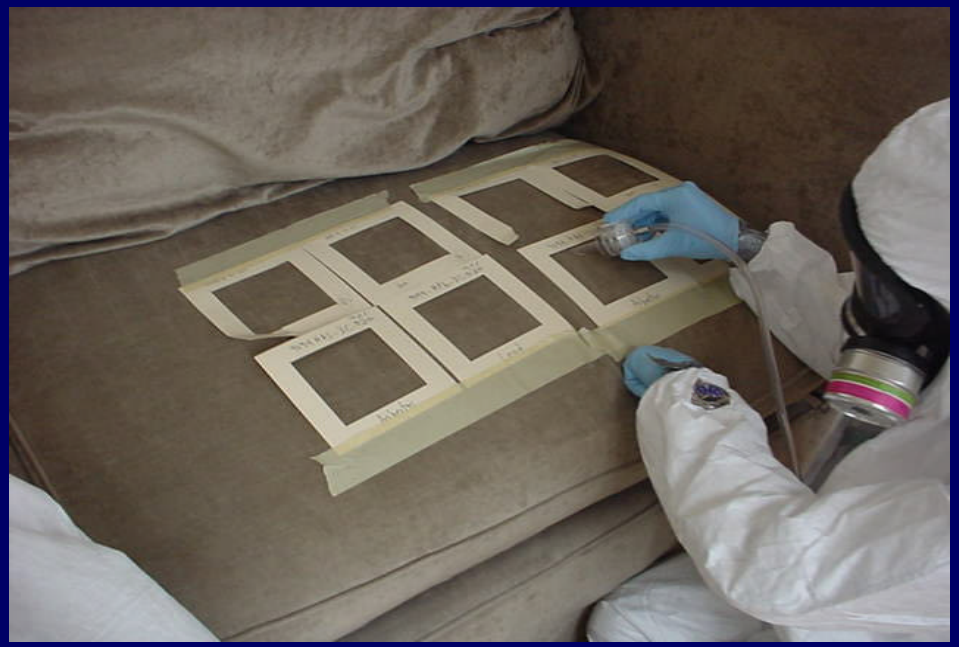
Asbestos Settled Dust Sampling Methods

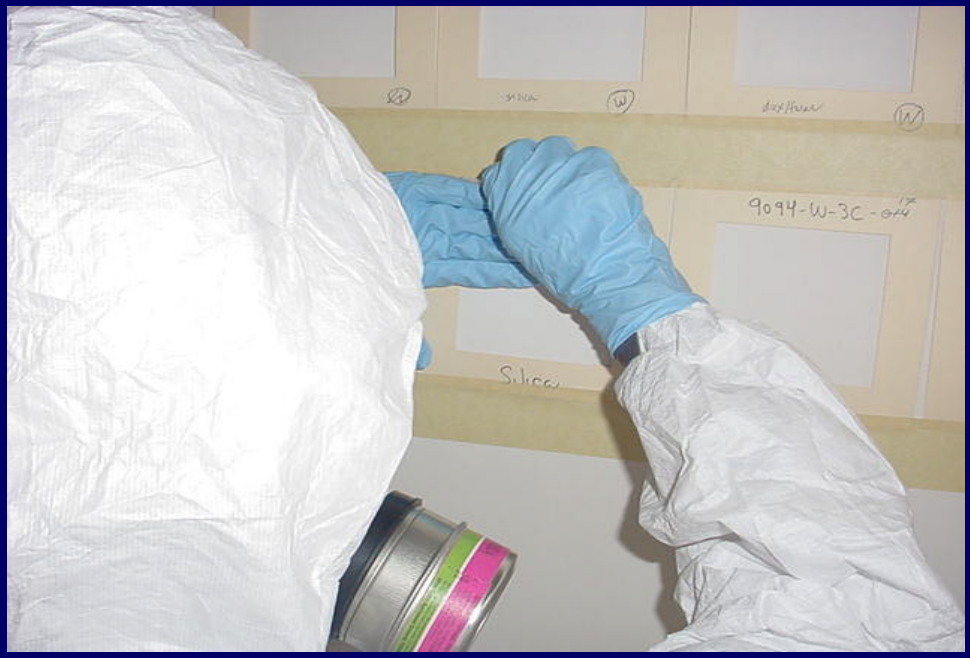
Basic Descriptions

- Microvacuum
  - ASTM 5755
  - Low-suction vacuum
  - Captures dust and fibers on filter cassette
  - Preserves dust matrix



Basic Descriptions

- Wipe sampling
  - ASTM D 6480
  - Moist fabric (e.g., handi-wipe)
  - Extracts dust and fibers from surface
  - Dissolves dust matrix



Method Comparison for Asbestos and Other Fibers

Microvacuum

- More equipment intensive
- Equally applicable on hard and porous surfaces
- Preserves dust matrix
- ASTM experience standard for interpretation of results for asbestos

Wipe

- Easy
- Generally more efficient on hard surfaces, but not well suited for porous surfaces
- Destroys dust matrix
- No recognized interpretation of results for asbestos or other fibers

Analysis of Collected Samples

- Dust (microvacuum or wipe)
  - TEM – PCMe analysis (asbestos fibers >5 um)
  - TEM – AHERA analysis (asbestos fibers >0.5 um)
  - TEM – Non-asbestos fibers (>0.5 um)
  - PCM – NIOSH 7400 (all fibers >5 um)
- No standards for interpreting results from settled dust, but they are available for air
- All of the analytical measures mentioned above are available from the WTC studies conducted by EPA via air sampling

Point of Clarification

- Standard exists for measuring amount of asbestos (by mass) in building materials, as per NESHAPS (i.e., 1% rule), EPA/600R-93/116
- This rule is not very useful to manage asbestos contaminated dust in indoor environments
- EPA utilized 1% rule for rough characterization of bulk dust/debris post-collapse, but it was not used to guide either outdoor or indoor dust/debris removal

Asbestos in Air
Sampling and Analysis

Detection Limit (Sensitivity)

- Dictated by volume of air sampled and filter area analyzed
- Detection limit established at .0005 f/cc
- Rule of thumb for detection limit = 1/3 of benchmark
- Constraints
  - Sample volume- overloads, volume flow, sampling duration
  - Microscopy – limited number of trained microscopists, increased sensitivity requires additional analysts and time

Fiber counting methods

- TEM – PCMe (asbestos fibers > 5um)
- TEM – AHERA (asbestos fibers > .5um)
- TEM – (non asbestos fiber > .5um)
- PCM – (All fibers > 5 um)

Definition of Exceedance

- .0009 f/cc PCMe health based benchmark
- 3 to 5+ samples per apartment
- 1 sample per room with minimum of 3 for studio apartments
- Clearance criteria – no exceedances

Duplicate and Replicate Sampling

AHERA Method

- 1 in 25 reread by second analyst (replicate)
- 1 in 50 repeated by same analyst (duplicate)
- Round robin and standard blanks to total of 10%

- Results do not pass internal QA if AHERA and NYSDOH standards not met

Confidence in sampling results

- Intrinsic variability and detection limit affect confidence in results
- Multiple samples increase effective filter area read per apartment thus increasing confidence

Structures	Samples	95% UCL (f/cc)
1	1	.0027
1	2	.0013
1	3	.0009
1	4	.0007

95% UCL of asbestos concentration (PCMe) for cleared apartments

Samples/apt	# apts	# detections	95% UCL (f/cc)
3	441	0 (419 apts)	.0006
3		1 (18 apts)	.0009
3		2 (4 apts)	.0012
4	253	0 (244 apt)	.0004
4		1 (9 apts)	.0007
5	2381	0 (2224 apts)	.0003
5		1 (139 apts)	.0005
5		2 (16 apts)	.0007
5		4 (2 apts)	.0011
6 or more	922	<4 (921 apts)	<.0009
		4 (1 apt)	.001

Relationship between short and long fibers

	Asbestos - TEM >=5u (PCMe)	Asbestos - TEM >0.5u (AHERA)	Total Non-Asbestos Fibers (TEM)	Fibers – NIOSH 7400 (PCM)
Common Areas	161	453	27957	64383
Apts				
A	105	344	21417	59716
B	267	849	31448	77084
C	371	1213	20997	55169
D	59	199	21994	93598
Apt Total	802	2605	95856	285566

Background values for Asbestos

test-only data (LM-Pre), clean and test data (LM-Post),
upper Manhattan data (UM)
residential data (Residence) and the data from all buildings (All) from HEI